

**§ 53.22 Generation of test atmospheres.**

(a) Table B–2 to subpart B of part 53 specifies preferred methods for generating test atmospheres and suggested methods of verifying their concentrations. Only one means of establishing the concentration of a test atmosphere is normally required, provided that that means is adequately accurate and credible. If the method of generation can produce accurate, reproducible concentrations, verification is optional. If the method of generation is not reproducible or reasonably quantifiable, then establishment of the concentration by some credible verification method is required.

(b) The test atmosphere delivery system shall be designed and constructed so as not to significantly alter the test atmosphere composition or concentration during the period of the test. The system shall be vented to insure that test atmospheres are presented to the test analyzer at very nearly atmospheric pressure. The delivery system shall be fabricated from borosilicate glass, FEP Teflon, or other material that is inert with regard to the gas or gases to be used.

(c) The output of the test atmosphere generation system shall be sufficiently stable to obtain stable response readings from the test analyzer during the required tests. If a permeation device is used for generation of a test atmosphere, the device, as well as the air passing over it, shall be controlled to 0.1 °C.

(d) All diluent air shall be zero air free of contaminants likely to react with the test atmospheres or cause a detectable response on the test analyzer.

(e) The concentration of each test atmosphere used shall be quantitatively established and/or verified before or during each series of tests. Samples for verifying test concentrations shall be collected from the test atmosphere delivery system as close as feasible to the sample intake port of the test analyzer.

(f) The accuracy of all flow measurements used to calculate test atmosphere concentrations shall be documented and referenced to a primary flow rate or volume standard (such as a spirometer, bubble meter, *etc.*). Any

corrections shall be clearly shown. All flow measurements given in volume units shall be standardized to 25 °C and 760 mm Hg.

(g) Schematic drawings, photos, descriptions, and other information showing complete procedural details of the test atmosphere generation, verification, and delivery system shall be provided. All pertinent calculations shall be clearly indicated.

**§ 53.23 Test procedures.**

(a) *Range*—(1) *Technical definition.* The nominal minimum and maximum concentrations that a method is capable of measuring.

NOTE TO § 53.23(a)(1): The nominal range is given as the lower and upper range limits in concentration units, for example, 0–0.5 parts per million (ppm).

(2) *Test procedure.* Determine and submit a suitable calibration curve, as specified in § 53.21(b), showing the test analyzer's measurement response over at least 95 percent of the required or indicated measurement range.

NOTE TO § 53.23(a)(2): A single calibration curve for each measurement range for which an FRM or FEM designation is sought will normally suffice.

(b) *Noise*—(1) *Technical definition.* Spontaneous, short duration deviations in measurements or measurement signal output, about the mean output, that are not caused by input concentration changes. Measurement noise is determined as the standard deviation of a series of measurements of a constant concentration about the mean and is expressed in concentration units.

(2) *Test procedure.* (i) Allow sufficient time for the test analyzer to warm up and stabilize. Determine measurement noise at each of two fixed concentrations, first using zero air and then a pollutant test gas concentration as indicated below. The noise limit specification in table B–1 to subpart B of part 53 shall apply to both of these tests.

(ii) For an analyzer with an analog signal output, connect an integrating-type digital meter (DM) suitable for the test analyzer's output and accurate to three significant digits, to determine the analyzer's measurement output signal.